

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

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XII.—THE COLLECTION OF VINES (VITIS, ETC.)
AT KEW.

(With Plate.)

The collection of hardy species and varieties of *Vitis* and allied genera at Kew is grown on a pergola running N.N.E. from near the Pagoda towards the Ruined Arch, and parallel with the avenue of Robinias and Gleditschias. This was erected and the vines planted in the autumn of 1912 (see *K.B.* 1913, p. 51). For some forty years previously the collection had been grown on a curving line of iron posts between the North Gallery and the Maple collection. The posts were so short that the plants had to be treated as bushes rather than climbers. They stood their removal to new quarters very well, and few were lost. As may be judged from the accompanying illustration, they have succeeded admirably and in four seasons have almost clothed their supports.

As garden ornaments this group of climbers have no flower beauty to recommend them, nor, in our climate, can we expect them to bear and ripen fruit to any great extent in the open ground. Their value lies in the noble proportions or handsome cutting of their foliage, their vigour of growth, but above all in the richness of the autumnal colouring.

Since the publication of the *Genera Plantarum* in 1862 the vines at Kew have been labelled in accordance with Bentham and Hooker's conception of *Vitis*. These authors made it include, besides *Vitis* proper, *Ampelopsis* and *Cissus*. The late Mr. Planchon published a valuable monograph of the *Ampelidae* in 1887 (De Candolle's *Monographiae Phanerogamerum* vol. v.), and since then there has been a disposition generally to adopt his views as to generic limitations in this family. Following his classification, the hardy or nearly hardy species in cultivation at Kew are, in the subjoined list, divided amongst the genera *Vitis*, *Ampelopsis*, *Parthenocissus* and *Cissus*.

SPECIES CULTIVATED AT KEW.

Vitis, Linn.

- V. aestivalis*, Mich. United States.
V. amurensis, Rupr. Manchuria, Corea, N. China.
V. arizonica, Engelm. S.W. United States.
V. armata, Diels et Gilg. China.
V. armata var. *Veitchii*, Hort. China.
V. Baileyana, Munson. S.E. United States.
 **V. Berlandieri*, Planch. S.W. United States.
V. bicolor, Le Conte. United States.
V. Bourquiniana, Munson. United States.
V. californica, Benth. W. North America.
 **V. candicans*, Engelm. Texas.
V. Champinii, Planch. S.W. Texas.
V. cinerea, Engelm. United States.
V. Coignetiae, Pull. Japan.
V. cordifolia, Michx. United States.
 **V. Doaniana*, Munson. Texas and New Mexico.
V. ficifolia, Bunge. China.
 **V. flexuosa*, Thunberg. Japan and Corea.
 **V. flexuosa*, var. *Wilsoni*, Veitch. China.
V. Labrusca, L. E. North America.
V. Longii, Prince. S.W. United States.
 **V. monticola*, Buckl. Texas.
V. palmata, Vahl. S. United States.
V. Pagnucci, Rom. du Caill. China.
V. Piasezkii, Maxim. Central China.
V. pulchra, Rehder. China.
V. Romanetii, Rom. du Caill. China.
 **V. rotundifolia*, Michx. S. United States.
V. rupestris, Scheele. S.E. United States.
V. Thunbergii, S. et Z. Japan.
V. Treleasei, Munson. S.W. United States.
V. vinifera, L. S.E. Europe and Asia Minor.
V. vinifera var. *apiifolia*, Loudon. Garden Origin.
V. vinifera var. *corinthiaca*, "Currant Grape," Greece.
 **V. vinifera* var. *incana*, "Miller Grape." Garden Origin ?
V. vinifera var. *purpurea*, "Teinturier Grape." Garden Origin.
V. vulpina, L. E. North America.

The species marked * are missing from the collection, having been lost in transplanting. Cuttings or plants of them would be welcomed.

Ampelopsis, Michx.

- A. aconitifolia*, Bunge. China.
A. aegyrophylla, Planch. Persia to Turkestan.
A. arborea, Koehne. S. United States.
A. brevipedunculata, Koehne. N.E. Asia.
A. citrulloides, Hort. Hab. ?
A. cordata, Michx. (*Vitis indivisa*, Willd.) S. United States.
A. Delarayana, Franch. W. China.

- A. heterophylla*, S. et Z. China, Japan, Corea.
A. heterophylla var. *elegans*, Regel. Garden Origin.
A. megalophylla, Diels. W. China.
A. micans, Rehd. (*Vitis repens*, Veitch.) W. China.
A. micans var. *cinerea*, Rehd. W. China.
A. orientalis, Planch. Asia Minor, Syria.

Parthenocissus, Planchon. (Psedera, Necker.)

- P. Henryana*, Diels et Gilg. China.
P. Henryana var. *glaucescens*, Diels et Gilg. (V. Thomsoni, Veitch; non Laws.) China.
P. himalayana, Planch. Himalaya.
P. himalayana var. *rubrifolia*, Gagnep. W. China.
P. laetevirens, Rehd. Central China.
P. quinquefolia, Graeb. North America.
P. quinquefolia var. *hirsuta*, Rehd. S.E. United States.
P. quinquefolia var. *murorum*, Rehd. S. United States.
P. semicordata, Planch. Himalaya.
P. sinensis, Diels et Gilg. China.
P. tricuspidata, Planch. (*Vitis inconstans*, Miq.) China, Japan.
P. tricuspidata var. *Lowi*. Garden Origin.
P. vitacea, Hitchc. North America.
P. vitacea var. *laciniata*, Rehd. North America.
P. vitacea var. *macrophylla*, Rehd. (var. *major*, Hort.)

Cissus, Linn.

- C. striata*, Ruiz et Pav. Chile.

XIII.—REVISION OF ASPIDOPTERYS.

J. HUTCHINSON.

Aspidopterys is a genus of about 20 species of tall climbing shrubs, native of the forests of India, and of the Malay Archipelago. It may be recognised in the family *Malpighiaceae* by its opposite leaves, eglandular calyx, sessile entire petals, ten stamens, three styles, and the nucleus of the fruit (samara) completely surrounded by the broad, oblong, ovate or orbicular membranous shield-like wing. Although the fruits are so well adapted for dispersal by the wind, the majority of the species are extremely limited in their distribution. In this respect it is noteworthy that the species with the largest samara (fig. 14) is the most widely dispersed. This is *A. elliptica*, A. Juss., which occurs in Java, Borneo and the Philippine Islands. It is probably also represented in Tonkin by *A. macrocarpa*, Dop, a species not known to the writer, but which appears to be very closely related if not identical. Another species with a considerable distribution is *A. concava* (fig. 10), with extremely light membranous fruits, which occurs from Burma through the Malay Peninsula and Indo-China to the Island of Borneo.

The shape of the fruits is apparently of primary importance in the classification of the species, and in the present revision two sections have been established on this feature. Then in several species the presence or absence of clothing hairs above the articulation of the pedicel is an easily distinguishable character which has evidently not received sufficient attention.

The Indian species remain as defined by Sir J. D. Hooker in the Flora of British India, with the exception of his "*A. Roxburghiana*," which, there is little doubt, covers three distinct species, (1) *A. indica*, (Roxb.) Hochr., from the Cuddapah District of Madras, (2) *A. glabriuscula*, A. Juss., from Sikkim, Bhotan, Assam and Yunnan, and (3) *A. oxyphylla*, A. Juss., from Sylhet and the Khasia Hills. The first two species have amongst other differences elongate, more or less oblong or lanceolate fruits, the last orbicular fruits (fig. 16), a fact not known to Hooker for want of adequate material.

The distribution of the genus in the Malay Archipelago is entirely confined to the Western Islands, *i.e.*, to the Indo-Malayan Region as defined by Wallace (see The Malay Archipelago, p. 13, and physical map), and in the case of this small genus supports in a striking manner his conclusions, which were based principally on a study of the fauna of the Archipelago.

The writer is much indebted to the Keeper, Botanical Department, Natural History Museum, South Kensington, for affording facilities in the examination of the material under his charge, and to the Regius Keeper, Royal Botanic Garden, Edinburgh, for the loan of material.

The distribution of the species is shown in the table on p. 102.

CLAVIS SPECIERUM.

I. Oblongae, sect. nov.—*Samara oblonga vel lineari-oblonga vel ovato-lanceolata, multum longior quam lata, marginibus plerumque plus minusve parallelis* :—

Ramuli et inflorescentiae rhachis plus minusve pilis debilibus patulis dense hirsuta; folia brevissime petiolata, basi conspicue cordata, abrupte caudato-acuminata, dense ciliata 1. *hirsuta*.

Ramuli et inflorescentiae rhachis glabra vel breviter pubescens; folia plerumque sensim acuminata, haud ciliata, basi rarius cordata :—

Folia matura infra plus minusve dense ferrugineo-tomentosa vel villosa :—

Sepala extra glabra :—

Sepala haud ciliata; species yunnanensis 2. *Henryi*.

Sepala ciliata; species javanensis ... 10. *tomentosa*.

Sepala extra villosa; species indo-chinensis 3. *Thorelii*.

Folia matura infra glabra vel solum in nervis breviter pubescentia:—

Pedicelli supra articulationem et calyx glaber 4. *floribunda*.

Pedicelli supra articulationem et calyx conspicue pubescens:—

Samara elongata et angusta, utrinque aequilata vel leviter angustata; species maderaspatensis 5. *indica*.

Samara plus minusve ovata vel lanceolata, apicem versus angustata; species ind. orient. borealis 6. *glabriuscula*.

II. Orbiculares, sect. nov.—*Samara orbicularis vel suborbicularis, plerumque via longior quam lata*:—

Flores axillares, simpliciter pedicellati vel in racemos brevissimos dispositi; ramuli longitudinaliter sulcati, cortice glabro cinereo obtecti; folia elliptica vel obovato-elliptica, obtusissime et sensim acuminata, basi breviter cuneata, glabra; samara membranacea 7. *canarensis*.

Flores in paniculas vel cymas multiramosas dispositi:—

*Pedicelli supra articulationem glabri:—

†Rhachis inflorescentiae et saepe ramuli et foliorum pagina inferior conspicue et frequenter dense pubescens:—

Fructus dorso inter-alias crista lata instructus:—

Folia utrinque plus minusve cordata, apice prominenter cuspidata, infra molliter tomentosa 8. *obcordata*.

Folia solum ad basin cordata vel rotundata, plus minusve sensim acuminata:—

Folia orbicularia vel late ovato-orbicularia, fere lata quam longa:—

Folia circiter 8 cm. lata; petioli dense rufo-tomentosi:—

Folia infra solum in costa pubescentia, nervis tertiariis supra conspicuis 9. *Helferiana*.

Folia infra ubique molliter tomentosa, nervis tertiariis supra inconspicuis 10. *tomentosa*.

Folia 9–13 cm. lata; petioli minute appresse pubescentes vel fere glabri 11. *Cavaleriei*.

Folia oblongo-elliptica, multo longiora quam lata; samara membranaceo-hyalina 12. *concava*.

Fructus dorso inter alias ecristatus vel basin versus leviter carinatus :—

- Folia orbicularia vel ovato-lanceolata et etiam infra plus minusve dense pubescentia, basi rotundata; pedicelli supra articulationem glabri 13. *nutans*.
- Folia orbicularia, basi cordata, acumine basi lato; pedicelli supra articulationem interdum pubescentes 21. *cordata*.
- Folia lanceolata, longe acuminata, infra glabra 14. *oxyphylla*.
- ††Rhachis inflorescentiae et saepe ramuli glabri vel fere glabri; folia infra glabra:—
- Samara matura probabiliter infra 2 cm. diametro 15. *andamanica*.
- Samara matura circiter 4 cm. diametro:—
- Samara plus minusve orbicularis ... 16. *elliptica*.
- Samara ovato-orbicularis; species non visa 17. *macrocarpa*.
- **Pedicelli supra articulationem pubescentes vel subtomentosi; folia infra plerumque tomentosa:—
- Sepala extra dense villosa 18. *Esquirolii*.
- Sepala extra glabra vel glabriuscula:—
- Sepala ciliata; folia saepe haud cordata:—
- Folia infra plerumque dense tomentosa; samara dorso ecristata ... 19. *Wallichii*.
- Folia infra glabra; samara dorso conspicue cristata 20. *Harmandiana*.
- Sepala haud ciliata; folia plerumque cordata 21. *cordata*.

1. **A. hirsuta**, A. Juss. in Ann. Sci. Nat. Ser. II. xiii. 267 (1840), et Monogr. Malpigh. 258, t. xvii. 27 (1843); Hook. f. Fl. Brit. Ind. i. 421 (1874); Kurz, For. Fl. Burma, i. 176 (1877); Craib in Aberdeen Univ. Stud. no. 57, 31 (1912). *Hiraea hirsuta*, Wall. Pl. As. Rar. 1. 13, t. 13 (1830); Wall. Cat. 1059.

BURMA. Prome district; Taong dong and the Prome Mts., Wallich 1059; Katha district; Pyide Reserve, Nov., fr. Lace 4489; Hort. Serampore.

SIAM. Doi Soote, mixed jungle, 450 m., Oct., fls., Kerr 1448.

2. **A. Henryi**, Hutchinson, sp. nov.

Scandens; ramuli patentes, dense ferrugineo-tomentosi, subteretes. Folia late ovata vel ovato-orbicularia, breviter acute acuminata, basi rotundata vel leviter cordata, 8-10 cm. longa, 5-7 cm. lata, tenuiter chartacea, supra glabra, minute foveolata,

infra dense ferrugineo-tomentosa, evenosa; nervi laterales utrinsecus circiter 6, arcuati, dense hirsuti; petioli 0.7–1 cm. longi, ferrugineo-hirsuti. *Inflorescentiae* racemoso-paniculatae, basin versus foliatae, terminales et laterales, usque ad 25 cm. longae, ubique dense ferrugineo-tomentosae; rami sub angulo 90° divergentes, usque ad 6 cm. longi, demum in fructu 15 cm. longi; ramuli ultimi usque ad 1 cm. longi, graciles, bracteis parvis hirsutis subtendentibus; pedicelli fasciculati, 4–6 mm. longi, gracillimi, basin versus articulati, supra articulationem glabri. *Sepala* 5, subaequalia, elliptica vel elliptico-obovata, submembranacea, 1.25 mm. longa, 0.75 mm. lata, glabra pilis paucis apicem versus exceptis. *Petala* 5, obovata, 4–5 mm. longa, circiter 2 mm. lata, glabra. *Stamina* 10; filamenta basi connata, glabra; antherae late ellipsoideae, 1 mm. longae. *Ovarium* parce setosum; styli 2.5 mm. longi, glabri, stigmatibus capitatis subglobois nigrescentibus. *Samara* elongato-oblonga, 3.5–4 cm. longa, 1.5–1.8 cm. lata, laxe reticulata, glabra; pedicelli fructiferi 1.5–2 cm. longi.

CHINA. Yunnan: Mengtze, south eastern forests, 1650 m., A. Henry 11055a.

3. **A. Thorelii**, *Dop* in Bull. Soc. Bot. France, lv. 428 (1908), et in Lecomte, Fl. Indo-Chine, i. 602, fig. 64, 5 (1911).

FRENCH INDO-CHINA. Laos: Mekong river valley, near Lakhon, *Thorel* 3037.

An example of this species has not been seen. The fruit figured by Lecomte (l.c.), which I have reproduced on the plate (fig. 3), is said to be natural size, and must be the smallest yet known in the genus.

4. **A. floribunda**, *Hutchinson*, sp. nov.

Frutex alte scandens; ramuli ultimi subteretes, cortice brunneo parce appresse pubescente obtecti. *Folia* elliptica vel ovato-elliptica, breviter acute acuminata, basi rotundata vel leviter cordata, 7–11 cm. longa, 4–6.5 cm. lata, tenuiter chartacea, supra glabra, subnitida, infra costa et nervis appresse pubescentibus exceptis glabra; nervi laterales utrinsecus 4–5, arcuati; petioli 0.7–1 cm. longi, parce pubescentes. *Inflorescentia* paniculata, multiflora, usque ad 30 cm. longa et 15 cm. expansa, breviter ferrugineo-pubescentis; bractae lineari-lanceolatae, acutae, usque ad 8 mm. longae, appresse ferrugineo-tomentosae; pedicelli fasciculati, graciles, basin versus articulati, supra articulationem glabri, usque ad 0.8 cm. longi. *Sepala* elliptico-obovata, apice rotundata, circiter 1 mm. longa, glabra, margine anguste membranacea. *Petala* elliptico-obovata, 3.5–4 mm. longa, glabra. *Stamina* stylis paullo breviora; filamenta glabra; antherae 0.65 mm. longae. *Ovarium* glabrum; styli glabri. *Samara* oblonga vel oblongo-lanceolata, apicem versus angustata, 4–5 cm. longa, 1.7–2.3 cm. lata, membranacea, straminea, conspicue nervosa et reticulata.

CHINA. Yunnan: Puerh, 1500 m., fls., A. Henry 10455B; Mengtze, mountain cliffs, 1620 m., fr., A. Henry 10455; western

flank of the Shweli-Salwin divide, amongst scrub, Aug., fls., *Forrest* 9127 (Herb. Edinb.).

INDIA. Assam: "Assam and Khasia Hills," *Simons* (Dehra Dun Herb.); Cachar, *Keenan*.

5. *A. indica*, *Hochreut.* in Bull. Inst. Buitenz. xix. 45 (1904).

Triopteris indica, Roxb. Cor. Pl. ii. 32, t. 160 (1798); Willd. Sp. Pl. ii. 744 (1799). *Hiraea indica*, Roxb. Hort. Beng. 90 (1814), et Fl. Ind. ii. 448 (1832); DC. Prodr. i. 585 (1824); Wall. Pl. As. Rar. i. 13 (1830). *Aspidopterys Roxburghiana*, A. Juss. in Ann. Sci. Nat. Ser II. xiii. 267 (1840), et Monogr. Malpigh. 257, excl. Wall. 1057 (1843); Hook. f. Fl. Brit. Ind. i. 420, excl. vars. et syn. A. Juss. (1874).

INDIA. Madras: Cuddapah, 330 m., Oct., fls., *Gamble* 18242; *Beddome* 815 (Herb. Brit. Mus.); Seshachalam hills, *Hon. W. Elliot* in Herb. Cleghorn; Palkonda, Oct., fr., *Campbell* (Herb. Brit. Mus.); Nandaradah, *Rottler*. "Western Peninsula," without precise locality, *Herb. Wight* 297, 920; *Roxburgh* (Herb. Edinb.); *Cleghorn* 42 (Herb. Edinb.); *Russel* (Herb. Brit. Mus.).

A. indica, *A. glabriuscula* and *A. oxyphylla* were included in one species, *A. Roxburghiana*, A. Juss., in the Flora of British India. They may be readily distinguished from one another by their fruits, as shown in the key, and *A. indica* is, in addition, confined to the Western Peninsula, probably entirely to Madras, whilst the other two occur in Sikkim and Assam, with *A. glabriuscula* extending into Southern Yunnan. I have not seen mature fruits of *A. oxyphylla*, but the half-ripe examples of *Clarke's* specimens are already almost orbicular, and of a very different shape from those of the other two species, where they are oblong or oblong-lanceolate. The fruits of *A. oxyphylla* were not known to *Hooker*.

6. *A. glabriuscula*, A. Juss. in Ann. Sci. Nat. Ser. II. xiii. 267 (1840), et Monogr. Malpigh. 257 (1843). *Hiraea glabriuscula*, Wall Cat. 6626. *Aspidopterys Roxburghiana*, var. 2, Hook. f. Fl. Brit. Ind. i. 420.

INDIA. Sikkim: Pomong, 1000 m., Aug., fls., *Clarke* 8811; Ryhap, Oct., fr., *Clarke* 13491; lower hills, *Hooker*; Lingcham, 1600 m., Oct., *Clarke* 25474 A; without definite locality, *Thomson* (Herb. Edinb.). Bhotan, *Griffith* 663 (Herb. Edinb.). Assam: Khasia Hills; *Kurz* (Herb. Edinb.); *Jenkins*; *Griffith* 386, 919; *Lobb*; 600-1620 m., *Hooker* and *Thomson*; Nunklow, July 13, 1850, *Hooker* and *Thomson* (No. 1689); Myrung, July 26, 1850, *Hooker* and *Thomson*; Mishmee, *Griffith*; Jaintea Hills; Nurtrung, Oct. 1, 1850, *Hooker* and *Thomson*; Mooshye, 600-1600 m., Sept. 24, 1850, *Hooker* and *Thompson*; Jowye, 1300 m., Oct., *Clarke* 6008; Churra, Aug. 12, 1850, *Hooker* and *Thomson*; *Wallich* 6626. Naga Hills; Kohima, 1800 m., Oct., *Clarke* 41753.

CHINA. Yunnan: Szemao, forests to the north-west, 1640 m., *A. Henry* 10455 A (Herb. Edinb.).

See note under *A. indica*.

7. **A. canarensis**, Dalz. in Hook. Kew Journ. Bot. iii. 37 (1851); Hook. f. Fl. Brit. Ind. i. 420 (1874); Talb. Trees Bomb. 29 (1894); Woodr. in Journ. Bomb. Nat. v. ii. 265 (1897); Cooke, Fl. Bomb. i. 159 (1901); Gamble, Fl. Madras i. 129 (1915). *A. glomerata*, Wight, Ic. t. 1986 (1853).

INDIA. Bombay: near Bombay, *Dalzell*; Concan, *Stocks*; North Kanara; evergreen forests of the Supa Gháts, *Talbot*; Kumta and Sirsi Road, *Woodrow*; Nilkund, *Woodrow*; South Kanara; Mangalor, *Hohenacker* 2355; Gudda Badschagee, *Hohenacker*. Mysore: *Cleghorn*, Apr., fls. *Wight*; without definite locality, *Wight* 567.

8. **A. obcordata**, Hemsl. in Hook. Ic. Pl. t. 2673 (1900).

CHINA. Yunnan: Fulo forests to the south of Szemeo, 1600 m., fls. white, *A. Henry* 12894.

SIAM. Ban Ta kaw, near Wieng Papao, 550 m., Mar., fls., *Kerr* 2516; Me Khan, Mar., fls. and fr., *Linit* 68.

BURMA. Tharrawaddy district; Myodwui, Mar., fls., *Lace* 5712; Pegu district; Aingdou-Kun Reserve, Mar., fls., *Lace* 6109; Shan Hills, 650 m., Mar., fls., *Collett* 433.

A very distinct species with the triangular acumen of the leaves protruding from a wide and often fairly deep sinus, the leaf being in outline cordate at both ends.

9. **A. Helferiana**, Kurz in Journ. As. Soc. Beng. xliii. ii. 137 (1874), partim, excl. *Wallich* 1057.

BURMA. Tenasserim: Moulmein district, *Helfer* 923; *Falconer*, partim (quoad folia in Herb. Edinb.).

10. **A. tomentosa**, A. Juss. in Ann. Sci. Nat. Ser. ii. xiii. 267 (1840); Miq. Fl. Ind. Bat. i. ii. 586 (1859); Hochreut. Cat. Bog. Nov. i. 45 (1904). *Hiraea tomentosa*, Blume, Bijdr. 225 (1825).

MALAY ARCHIPELAGO. Java: Parang, *Horsfield* 915; Buitenzorg, *Hochreutiner* 34.

I have not seen fruits of this species, and have therefore put it into two places in the key. Its natural position, however, seems to be nearest *A. Helferiana*, and probably the fruits when known will prove to be orbicular as in that species.

11. **A. Cavaleriei**, Léveillé in Fedde, Repert. ix. 458 (1911). *A. Dunniana*, Léveillé, l.c. xi. 65 (1912).

CHINA. Kou-chow: Lofou, Apr., fls., *Cavalerie* 2993; Lungchow, *Morse* 512.

M. Léveillé seems to have described this species twice, for *Cavalerie* 2993 is quoted in each of the publications cited, and the two descriptions do not point to any mixture in this number.

12. **A. concava**, A. Juss. Monogr. Malpigh. 255 (1843); Hook. f. Fl. Brit. Ind. i. 420; Kurz, For. Fl. Brit. Burma, i. 175; King et Gamble, Mat. Fl. Mal. Penins. i. 195. *Hiraea concava*, Wall. Pl. As. Rar. i. 13 (1830); Wall. Cat. 1061. *H. merguensis*, Wight, Ill. i. 139 (1840). *Aspidopterys albo-marginata*, Hance in Journ. Bot. 1877, 330; Dop in Lecomte, Fl. Indo-Chine, i. 602 (1911).

BURMA. Martaban, Wallich, 1061; Moulmein, Falconer partim (quoad samaras in Herb. Edinb.); Mergui, Griffith 20.

MALAY PENINSULA. Selangor district; Damansara Hill, Mar., fr., Ridley; Penang; Government Hill, 330 m., Feb., fls., Curtis 138; 160 m., Apr., fr. Curtis 798; 330 m., Jan., fls., Curtis 3537.

INDO-CHINA. Cambodia: Kamchay; near Kampot, Pierre 19315.

MALAY ARCHIPELAGO. Borneo: Sarawak; near Kuching, Jan., fls., Haviland and Hosie 3732 K; Rejang, Apr., fls., Haviland 2857. Sumatra: without definite locality, Forbes 2941 (Herb. Mus. Brit.).

A large woody climber reaching to the tops of tall trees, almost leafless at this season (January), flowers white (Curtis 3537).

13. **A. nutans**, Hook. f. Fl. Brit. Ind. i. 421, non A. Juss. (1874); Kurz, For. Fl. Burma, i. 175 (1877); Lecomte, Fl. Indo-Chine, i. 601 (1911); Craib in Aberdeen Univ. Stud. no. 57, 31 (1912).

Hiraea nutans, Roxb. Fl. Ind. ii. 447 (1832). *H. orbiculata*, Roxb. Hort. Beng. 90 (1814); Wall. Pl. As. Rar. i. 13 (1830). *H. rotundifolia*, Roxb. l.c. 448. *H. indica*, Wall. Cat. 1057, partim, non Roxb. *H. lanuginosa*, Wall. Cat. 1058, partim, quoad spec. foliis villosis. *Aspidopterys Roxburghiana*, A. Juss. Monogr. Malpigh. 257, partim, quoad Wall. 1057; *A. lanuginosa*, A. Juss. l.c. 258; *A. rotundifolia*, A. Juss. l.c. 260; Prain, Beng. Pl. 290; *A. Roxburghiana*, forma, Hosseus in Beih. Bot. Centralbl. xxviii. 403.

INDIA. Oudh: forests north of Oudh, fr., R. Thomson 406. Nepal, fls. and fr., Wallich 1058. Sikkim: Darjeeling distr.; between Badamtam and Ranjeet River, 650 m., Aug., fls., Lace 2359; Ranjeet, 360 m., Aug., Clarke 27112 C.; Great Run-gut, Aug., fls. and fr., Hooker; Budum Than 1300 m., Aug., fls., Clarke 27075 A, 27075 C; Sookna, Dec., fr., Clarke 31708 B, 31708 H; Panchkilli, 350 m., June, fls., Clarke 26557 A; without definite locality, Griffith 917, 924; Treutler 1071; Beddome 817 (Herb. Mus. Brit.). Eastern Bengal: Chittagong, Wallich 1057/2 (Herb. Bruce); Calcutta Bot. Gard., Herb., Wallich 1057/1. Assam: Upper Assam, Jenkins 617; Goalpara, Hamilton 1093 and in Herb. Wallich 1057; Cachar side of Kala Naga hills, May, Watt 6903; "Assam and Khasia Hills," Simons.

BURMA. Chin Hills, Oct., Abdul Huk 53; Ponsshee, on the Yunnan border, Anderson; Bhamo, Jan., fr., Anderson; banks

of the Irrawadi at Bhamo, amongst scrub, Nov., fls. and young fr., *Forrest* 9238; Thôndaung, 850 m., Aug., fls., *Lace* 5911; without definite locality, *Beddome* 816 (Herb. Mus. Brit.).

SIAM. Me K'Mi, Feb., fr., *Kerr* 2354; Paknampo, Sept., fls., *Hosseus* 21.

FRENCH INDO-CHINA. Laos: Kemmarath, *Thorel*. Cambodia: Bang-nuoc, *Thorel*.

I have not seen any specimens from Indo-China, those quoted being the records in *Lecomte*, Fl. Indo-Chine, l.c.

14. **A. oxyphylla**, *A. Juss.* in Ann. Sci. Nat. Ser. ii. xiii. 267 (1840).

Hiraea oxyphylla Wall. Cat. 7264. *Aspidopterys Roxburghiana*, Hook. f. Fl. Brit. Ind. i. 420, partim.

INDIA. Assam: Sylhet, *Wallich* 7264. Khasia Hills; Theria, 620 m., Oct., fls. and young fr., *Clarke* 44919 A, 44919 B, 44919 F; Mahadeo, 800 m., Oct., fls., *Clarke* 44913 A.

15. **A. andamanica**, *Hutchinson*, sp. nov.

A. Helferiana, King, Mat. Fl. Mal. Penins. No. 6, 195, partim, non Kurz.

Frutex scandens; ramuli ultimi teretes, appresse pubescentes, demum glabri. *Folia* late elliptica vel oblongo-elliptica, basi rotundata vel cordata, apice abrupte et obtuse acuminata, 10–15 cm. longa, 5–9 cm. lata, acumine 1 1.5 cm. longo, tenuiter chartacea, utrinque glabra et subnitida; costa supra impressa, infra conspicua; nervi laterales utrinsecus 5–6, a costa sub angulo 45°–70° abeuntes, supra prominuli, infra prominentes; nervi tertiarrii a costa media sub angulo 90° divergentes, infra conspicui; petioli 1–1.5 cm. longi, glabri, supra profunde canaliculati. *Inflorescentia* multiflora, terminalis et axillaris, foliis brevior; rhachis fere glabra; pedicelli subfasciculati, graciles, circiter 1 cm. longi. *Sepala* oblongo-elliptica, apice rotundata, circiter 2 mm. longa, glabra. *Petala* obovata, 5 6 mm. longa, glabra. *Antherae* 2 mm. longae. Fructus vix maturus orbicularis, 1.7 cm. diametro, glaber, dorso breviter cristatus, siccus nigro-purpureus.

ANDAMAN ISLANDS. Shore Point at Port Blair, July, *King's Collector* 50; Cadellganj Hill jungle, Aug., *King's Collector*; without definite locality, *King's Collector* 417; Namunaghar, hill jungle, *King's Collector* (10.9.1892).

16. **A. elliptica**, *A. Juss.* in Ann. Sci. Nat. Ser. ii. xiii. 266 (1840).

Ryssopteris ovata, Turcz. in Bull. Soc. Nat. Mosc. xxxvi. i. 583 (1863). *Combretum sexalatum*, Merrill in Philipp. Journ. Sci. i., Suppl. 212, partim, quoad fructus (1906). *Aspidopterys ovata*, Merrill et Rolfe in Philipp. Journ. Sci. iii. 106 (1908).

MALAY ARCHIPELAGO. Java: *Blume* 25 (Herb. Brit. Mus.); *Lobb*; *Zollinger* 17207. Borneo: Bangarmassing, *Motley* 402; Tinkalayo, *Creagh*; Tanjong, Batu, *Creagh*.

PHILIPPINE ISLANDS. Luzon: Albay Province, *Cuming* 941, 945; Macaharing, *Loher* 175; Novaliches, Feb., fr., *Loher* 5138; Bosoboso, Rizal Province, fls., June, *Ahern's Collector* 1163, 3126; fr., Sept., *Ahern's Collector* 1868, 3321; Bosoboso, fls., July, *Merrill* 2811; Lucena, fls., June, *Merrill* 2891; Montalban, fls., May, *Loher* 5772. Masbate Island: fls., Nov., *Merrill* 3380. Ticao Island: fls., Mar., *Vidal* 2242. Panay Island: fr., Mar., *Vidal* 2738. Mindanao: Cadabaran, *Elmer* 13377.

Of the Philippine Islands specimens I have seen only those from Luzon; the remainder are those quoted by Merrill and Rolfe (l.c.).

17. **A. macrocarpa**, *Dop* in Bull. Soc. Bot. France, lv. 428 (1908), et in Lecomte, Fl. Indo-Chine i. 603 (1911).

INDO-CHINA. Tonkin: Neighbourhood of Ninh-binh, *Bon* 2283.

I have not seen an example of this species. The fruits figured by Lecomte, reproduced on the accompanying plate (fig. 15), are very similar to those of *A. elliptica* from the Malay Archipelago.

18. **A. Esquirolii**, Lévillé in Fedde, Repert. xi. 65 (1912).

CHINA. Kow-chow: Houa-Kiang, June, fls., *Cavalerie* 2032; Aug., *Esquirol* 593.

This species may be at once recognised in the genus by the externally densely hairy sepals.

19. **A. Wallichii**, Hook. f. Fl. Brit. Ind. i. 421 (1874).

Hiraea nutans, Wall. Pl. As. Rar. i. 13 (1830), et Cat. 1056, 1, non Roxburgh: *H. lanuginosa*, Wall. l.c., et Cat. 1058, partim, non A. Juss. *A. nutans*, A. Juss. in Ann. Sci. Nat. Ser. ii. xiii. 267 (1840), non Hook. f.

INDIA. Eastern Punjab: Sirmur; Banasur, *Edgeworth* 289; Hort. Govan. *Wallich* 1058; Simla, Aug., fls., *Lady Dalhousie* (Edinb. Herb.); Garhwal: June, fls., *Thomson* 1328. Kumaon: Ramganga Valley, below Bans Kumaon, 1000 m., *Reid*; without precise locality, *Blinkworth in Herb. Wallich* 1056, 1, and *Herb. Heyne* 1056; Gungoli, 1300 m., *Strachey* and *Winterbottom* 1. Dehra Dun district, Nov. and Jan., fr., *Gollan* (B specimen in Herb. Dehra Dun); ravines, Aug., fls., *Duthie* 1427; *Madden*; *Duthie's Collector* (*Harsukh*) in Edinb. Herb.; Dec., fr., *Kanjilal*; *Schlich* (Edinb. Herb.). Saharanpur: Dholhand, Nov., fr., *Gamble* 23986; Khairana, Oct., fr., *Omas-ton* 259. Oudh: Sarju Valley, 600-950 m., Aug., fls., *Duthie* 5405.

The type specimen of *Hiraea nutans*, Wallich (not of Roxb.), was "gathered by one of my plant-collectors on the lower range of hills at Kamoon," (Wallich l.c. i. 13); this refers no doubt to Blinkworth's gathering quoted above, which may therefore be looked upon as the type of *A. Wallichii*.

26. **A. Harmandiana**, *Pierre*, For. Fl. Cochinch. t. 275 (1893); Dop in Lecomte, Fl. Indo-Chine, i. 602 (1911).

FRENCH INDO-CHINA. Laos: Attopeu, *Harmand*; Kemmarath, *Thorel*. Cambodia: Bang-nuoc, *Thorel*.

21. **A. cordata**, *A. Juss.* in Ann. Sci. Nat. Ser. ii. xiii. 267 (1840); Hook. f. Fl. Brit. Ind. i. 421 (1874); Dalz. et Gibs. Fl. Bomb. 34 (1861); Talb. Trees, Bomb. 29 (1894); Woodr. in Journ. Bomb. Nat. v. ii. 265 (1897); Cooke, Fl. Bomb. i. 158 (1901). *Hiraea cordata*, Heyne in Wall. Cat. 1060. Wall. Pl. As. Rar. i. 13 (1830). *Hiraea nutans*, Wall. Cat. 1058, 2.

INDIA. Bombay: Thana district; Salsette Island, *Jacquemont* 991; Konkan, *Stocks*; Poona, *Woodrow* (Edinb. Herb.); hills near Matheran, without collector in *Poona Coll. of Sci. Herb.* (Edinb. Herb.); Singpur, without collector in *Poona Coll. of Sci. Herb.* (Edinb. Herb.); Belgaum, *Ritchie* 161 (Edinb. Herb.); *Ritchie* 101 (Kew Herb.); North Kanara; Yellapur, Oct., fls., *Talbot*; "Bombay," *Dalzell*. Mysore: Shimoga, 660-960 m., Oct., fls., *Meebold* 10805; without precise locality, *Wight* (Herb. propr.) 359; *Wight* (Kew. Distrib. 296); *Rottler*.

In this species the pedicels above the articulation are always more or less hairy, but they are frequently glabrous towards the apex.

Imperfectly known species.

22. **A. costulata**, *Pierre*, For. Fl. Cochinch. sub. t. 275 (1893); Dop in Lecomte, Fl. Indo-Chine, 604 (1911). *A. tomentosa*, *Pierre*, l.c. non *A. Juss.*

FRENCH INDO-CHINA. Cochin China: Province of Bienhoa; banks of the river Be, *Pierre* 2834.

EXCLUDED SPECIES.

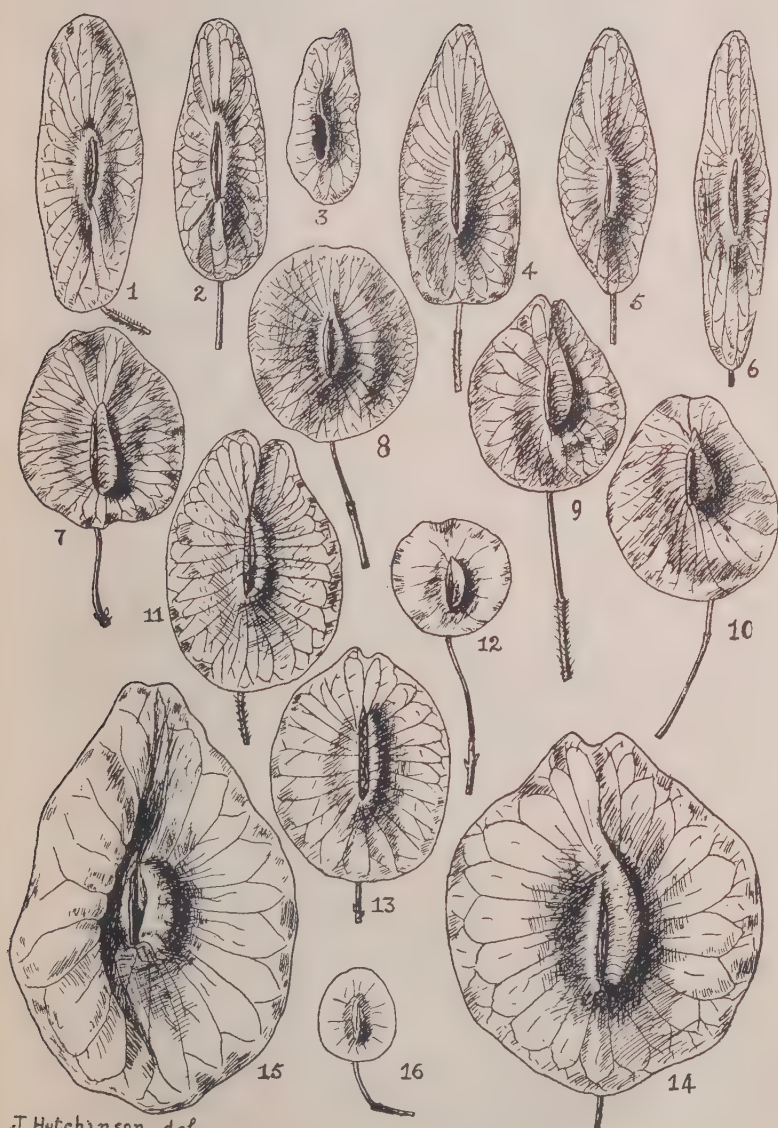
A. hypoglauca, *Léveillé* in Fedde, Repert. ix. 458 (1911) = *Tripterygium hypoglaucum*, *Hutchinson*, comb. nov. (*Celastraceae*).

EXPLANATION OF FIGURES ON P. 103.

In order to bring out the shape of the fruits more clearly, only one winged carpel has been shown (there are usually 2 or 3) as they usually appear on a mounted sheet:—Fig. 1, *A. hirsuta*; 2, *A. Henryi*; 3, *A. Thorelii*; 4, *A. floribunda*; 5, *glabriuscula*; 6, *A. indica*; 7, *A. canarensis*; 8, *A. obcordata*; 9, *A. Helferiana*; 10, *A. concava*; 11, *A. Wallichii*; 12, *A. andamanica* (immature); 13, *A. nutans*; 14, *A. elliptica*; 15, *A. macrocarpa*; 16, *A. oxyphylla* (immature); all slightly below natural size; Nos. 3 and 15 are after Lecomte, and show the inner face of the carpel, the remainder original, showing the outside of the carpel.

Table showing the distribution of the species of *Aspidopterys*.

	Bombay and Mysore.	Madras.	N. W. India.	N. India and Bengal.	Assam and Bhotan.	Yunnan.	S. China.	Burma.	Moulmein and Tenasserim.	Andamans.	Siam.	French Indo-China.	Malay Peninsula.	Sumatra.	Java.	Borneo.	Philippines.
1. <i>hirsuta</i> ...								*			*						
2. <i>Henryi</i> ...						*											
3. <i>Thorelii</i> ...												*					
4. <i>floribunda</i> ...					*	*											
5. <i>indica</i> ...		*															
6. <i>glabriuscula</i> ...				*	*	*											
7. <i>canarensis</i> ...	*																
8. <i>obcordata</i> ...						*		*			*						
9. <i>Helferiana</i> ...									*								
10. <i>tomentosa</i> ...															*		
11. <i>Cavaleriei</i> ...							*										
12. <i>concava</i> ...								*				*	*		*	*	
13. <i>nutans</i> ...				*	*			*			*	*					
14. <i>oxyphylla</i> ...					*												
15. <i>andamanica</i> ...										*							
16. <i>elliptica</i> ...															*	*	*
17. <i>macrocarpa</i> ...												*					
18. <i>Esquirolii</i> ...							*										
19. <i>Wallichii</i> ...			*														
20. <i>Harmandiana</i> ...												*					
21. <i>cordata</i> ...	*																
22. <i>costulata</i> ...												*					



J. Hutchinson del.

ASPIDOPTERYS.

XIV.—HEDYCHIUM CORONARIUM IN BRAZIL.

The following letter relating to *Hedychium coronarium* growing in a wild state in Brazil has been received by the Director from Mr. CLAYTON BEADLE, who recently undertook the journey to Brazil in order to see the extent to which *Hedychium* has become established and also to investigate the possibilities of using it for paper-making in the country and elsewhere:—

Laboratories,

15, Boro', S.E.

March 5th, 1917.

Dear Sir,

I have recently returned from my visit to South America, which I undertook for the special purpose of investigating the growth of *Hedychium coronarium* [see K.B., 1912, pp. 373-378].

I learnt on my arrival at Rio de Janeiro that *Hedychium* was to be found in the neighbourhood in small patches here and there and even near the town itself. I procured specimens which grew to a height of 10 or 12 feet. It is fairly well known in certain low-lying lands in the State of Rio, although not particularly abundant. Experiments made with a view to its cultivation in the State of Rio, particularly on land that has been cleared and used for sugar-cane, show very promising results, and this is a matter which is likely to be followed up in the State of Rio in the next few years. I was surprised to find very little *Hedychium* in the low-lying land at the back of Santos, because that land would appear, from its general character, to be particularly favourable to the growth of the plant. The district where *Hedychium* is particularly abundant is on the low-lying lands in the State of Parana, lying behind the ports of Antonina and Paranagua and stretching right away back from these ports to the mountains which rise precipitately to the plains where Curitiba is situated. The most abundant supplies are centred round about Morretes, the old capital of Parana and stretch for miles in many directions. In this district, however, *Hedychium* grows not only on the plains about sea-level, but is to be seen in abundance along the railway line which winds up to Curitiba up to an elevation of at least 1000 feet above sea-level. The size of the plant seems to diminish as one rises until it disappears altogether at an elevation of about 1500 feet. The normal height of the plant in the regions of the plains is about 5 feet. In certain favoured localities it reaches 10 and 12 feet, and is much bigger round in the stem. In such districts it is practically impossible to penetrate the dense growth. I was told that the flowering season was December or January. It appears to grow abundantly all the year round without any wintering; individual stems growing up and dying down in succession and throwing out new root-stocks. In places the ground underneath is more or less choked with the debris of dead stems. It seems to grow more vigorously after the ground is burnt over to clear it. If the undergrowth is burnt

off and even if stumps are left standing, *Hedychium* makes its appearance everywhere. This at first sight is difficult to account for, but on penetrating into the uncleared jungle one can see that *Hedychium* is already there waiting to make itself evident. I saw how it had taken possession of lands cleared for sugarcane and how it had taken possession of any piece of cleared land. The next thing after clearing for sugar is to clear from *Hedychium*. It is quite evident therefore that in this district particularly the growth of *Hedychium* can be stimulated almost illimitably. The soil is rich, the rainfall heavy and the land is interspersed with small streams. It is not necessary that the land should be flat, in fact, it grows abundantly on slopes and on the sides of steep railway cuttings, etc.

On my way south I found it again at San Francisco, Parana. This is the next port below Paranagua, and likely in time to become an important port for Curitiba. Here, again, stems were found up to 12 feet in length and in limited areas abundance of growth, which might well be extended by rough clearance.

I extracted the fibre from the green plant by mechanical means, imitating methods that would be employed for the preparation of the fibre for textile purposes, and came to the conclusion that a far whiter fibre may be extracted than has hitherto been employed by taking fairly simple precautions.

I visited various localities until we reached Rio Grande in the most southerly part of Brazil, also Uruguay, across the Argentine, up the Chilian and Peruvian Coasts, and finally came through the Panama Canal, and although I searched carefully I did not see any *Hedychium* after leaving the State of Parana.

I am communicating this information in the hopes that my observations may serve as an indication of the conditions under which *Hedychium* may be expected to flourish in those parts of the British Empire where favourable conditions prevail.

XV.—NIGERIAN FUNGI: III.

E. M. WAKEFIELD.

The present contribution is the outcome of further collections made by Mr. C. O. Farquharson in South Nigeria during the period 1914-1916. The specimens were well chosen and in excellent condition; hence, besides adding a number of species to the Nigerian list the collection has supplied further valuable information with regard to some previously recorded forms. Six species new to science were obtained; two of these, *Polystictus pyrophilus* and *Geaster pulverulentus*, have already been described (*Kew Bull.* No. 3, 1916).

The only fungus in the list which is at present known to be of economic importance is *Ustilina zonata*, which was found by Mr. Farquharson in 1914 to be causing a distinct disease of Para rubber in Nigeria. It has since been fully described as a cause of rubber disease in the Federated Malay States.

AGARICACEAE.

Lentinus velutinus, *Fr.* in *Linnaea*, 1830, p. 510.

Gambari Forest Reserve, No. 69.

These specimens were found growing out of the ground, but when dug out carefully each was found to arise from a small, smooth, more or less potato-shaped piece of wood, simulating a sclerotium. The wood is permeated by mycelium, and bounded externally by a thin dark layer, forming a delicate crust. The structure is exactly comparable with that described by Petch for the pseudosclerotia of *L. infundibuliformis* and *L. similis*. The pseudosclerotia in this case show evidence of injury by termites. The dark limiting layer is, however, continuous over the surface; hence it would appear either that this dark layer is formed after the wood has been partially eaten away by the white ants, or that the fungus mycelium is unpalatable to them and is left uninjured when the rest of the wood is destroyed.

POLYPORACEAE.

Polyporus pyrophilus, *Wakef.* in *Kew Bull.* 1916, p. 71.

On burnt ground, Nsulu-Aba District, Eastern Provinces. No. 50.

P. ostreaeformis, *Berk.* in *Journ. Linn. Soc.* xvi. 1877, p. 46.

Bonny, May, 1914; Opobo, May, 1914, No. 39.

This fungus is fairly common on wooden pier-piles along the sea front. It grows only a short distance above the surface of the water.

Amauroderma sericatum, *Lloyd.* *Syn. Stipitate Polyp.* 1912, p. 120.

On fragments of decaying wood sunk in the soil, Para rubber plantation, Economic Gardens, Calabar, No. 46.

Fomes yucatanensis (*Murr.*) *Sacc. et D. Sacc.* *Syll. Fung.* xvii. p. 116.

This species scarcely differs from *F. rimosus*, except in possessing setae in the hymenium.

F. pachyphloeus, *Pat.* in *Journ. de Bot.* iii. 1889, p. 257.

Gambari (Mamu) Forest Reserve, 1916, No. 73.

F. senex (*Nees et Mont.*) *Fr. Nov. Symb.* p. 62.

Gambari (Mamu) Forest Reserve, 1916, No. 72.

Both pileate and resupinate specimens were included in the one gathering.

F. albo-marginatus (*Zipp.*) *Cooke* in *Grevillea*, xiv. 1885, p. 19.

Polyporus albo-marginatus, *Zipp. ex Lév.* in *Ann. sci. nat. sér. 3*, vol. 2, 1844, p. 191, *P. Kermes*, *Berk. et Br.* in *Journ. Linn. Soc.* xiv. 1873, p. 49; *P. laeticolor*, *Berk.* in *Journ. Linn. Soc.* xvi. 1877, p. 46; *P. pyrrhocreas*, *Cooke* in *Grevillea*, xiv. 1885, p. 11.

This is the red-fleshed species which is common in the eastern Tropics, but the description given by Léveillé is poor and misleading. It does not appear to have been recorded previously for Africa.

Polystictus mutabilis (*Berk. et Curt.*) Cooke in Grevillea, xiv. 1886, p. 78.

Itu, Cross River, June, 1914, No. 45. On decaying wood in moist high forest.

P. versatilis (*Berk.*) *Fr.* Nov. Symb. p. 92.

On dead wood, under savannah conditions, Meko, No. 43.

P. vinosus (*Berk.*) *Sacc.* Syll. Fung. vi. p. 273.

Gambari (Mamu) Forest Reserve, 1916, No. 78.

P. caperatus (*Berk.*) *Fr.* Nov. Symb. p. 92.

Gambari (Mamu) Forest Reserve, 1916, No. 77.

The specimens are all thin forms, semi-resupinate and laterally confluent so as to form extensive patches. Similar forms have been received from Uganda.

P. tabacinus (*Mont.*) *Fr.* Nov. Symb. p. 93.

Itu, Cross River, June, 1914, No. 40. On decaying wood in moist high forest.

Poria calcea (*Berk. et Br.*) Cooke in Grevillea, xiv. 1886, p. 109. (Non *P. calcea* (*Fr.*) Bres. in Ann. Myc. vi. 1908, p. 41.)

Agege District, 1914, No. 54. Not uncommon under high forest conditions, where there is abundant moisture.

Trametes floccosa, *Bres.* in Ann. R. Ist. Bot. Roma, vi. 1896, p. 179. ✓

Economic Gardens, Calabar, July, 1914, No. 51.

The pore-surface when fresh is white, but on drying it becomes slightly tinged with pink.

Hexagonia hirta (*Pal.*) *Fr.* Epicr. p. 496.

Bonny, May, 1914, on dead wood near the sea, No. 38.

H. Miquelii (*Mont.*) *Sacc.* Syll. vi. p. 361.

On dead mango branches, Economic Gardens, Calabar, July, 1914, No. 55.

These specimens are very pale, both pileus and pores being more or less alutaceous, instead of reddish. Like typically coloured specimens received from Uganda, they are perfectly smooth. Patouillard (*Bull. Soc. Myc. Fr.* xxx. p. 339) would refer all such forms to *H. bipindiensis*, but it is difficult to understand in what way they are distinct from *H. Miquelii*.

Merulius insignis, *Wakef.* sp. nov.

Pileus dimidiatus vel postice subdecurrentis, ad 10 × 7 cm. expansus, mollis, azonatus, laete rubiginosus, in sicco rugulosus, 1-2 mm. crassus. *Tubuli* rubiginosi 0.5-0.75 mm. longi; *porei* concolori, irregulari, minuti, marginem versus deficientes. Margo sterilis albido-pallida. *Carne* albidum, tenue, molle. *Sporae* ellipticae, laete rubiginosae, 4-6 × 3-4 μ.

S. NIGERIA. Gambari (Mamu) Forest Reserve; on wood, *C. O. Farquharson*, 1916.

The species is very conspicuous on account of the bright orange-brown colour of the pileus and pores, which corresponds to "Mars yellow" of Ridgway's Color Standards. Both in colour and in the spore characters it is close to *M. binominatus*, Massee. The latter however has less of a red tinge in the colour, differs in habit, and has larger and deeper pores.

THELEPHORACEAE.

Cladoderris spongiosus, *Fr.* Fung. Nat. p. 140.

Agege and Calabar, 1914, No. 47.

This plant occurs habitually on dead branches of Cacao in the wet season.

Stereum involutum, *Kl. ex Fr.* Epicr. p. 546.

Itu, June, 1914, No. 52; Gambari (Mamu) Forest Reserve, 1916, No. 82.

S. bicolor (*Pers.*) *Fr.* Epicr. p. 549.

Eket District, June, 1914.

Hymenochaete tristicula (*B. et Br.*) *Mass.* in Journ. Linn. Soc. xxvii. 1890, p. 111. *H. castanea*, Wakef. in *Kew Bull.*, 1914, p. 260. See also *Kew Bull.*, 1916, p. 73.

Gambari (Mamu) Forest Reserve, 1916, No. 83.

Apparently common in Tropical Africa.

Cyphella fulvo-disca, *Cooke et Mass.* in *Grevillea*, xviii. 1890, p. 5, and in *Elliot, Hedwigia*, 29, 1890, p. 67.

— Agege, in the wet season, 1913, No. 53.

TREMELLACEAE.

Hirneola floccosa, *Wakef.* sp. nov.

Pileus imbricatus, sessilis, ad 11 cm. latus, postice subdecurrens, tomento fulvo molle e pilis longis 2·5–4·5 μ diametro dense floccoso-vestitus, azonatus, margine integro. *Hymenium* purpureo-vel castaneo-pruinatum, sub pruina nigricans. *Sporae* non visae. Hyphae subhymeniales et basales subgelatinosae, arcte conglomeratae, 5–7 μ diametro; hyphae centrales laxae intertextae, 1·5–2 μ diametro.

S. NIGERIA. Gambari Forest Reserve; on wood, *C. O. Farquharson*, 1916.

Distinct from all other known species of *Hirneola* in the soft, dense, woolly covering of the pileus. The long, lax, and slender hairs of which it is composed give it an appearance very different from that of the upper surface of, for instance, *H. polytricha*. The colour of the tomentum most nearly matches "Verona brown" of Ridgway.

The hymenium has a less gelatinous appearance than that of most species of the genus. Its colour lies between chocolate and Vandyke brown, with usually a more or less purplish cast.

GASTROMYCETACEAE.

Kalchbrennera corallocephala (*Welw. et Curr.*) *Kalchbr.* Phal-loideae novi vel minus cognitae, 1880, p. 21. *K. Tuckii* (*Kalchbr. et MacOw.*), Berk. in Gard. Chron. v. 1876, p. 785.

Ibadan, 1916, No. 86.

Geaster pulverulentus, *Wakef.* in *Kew Bull.* No. 3, 1916, p. 73.
Agege, July, 1914, No. 58.

PYRENOMYCETACEAE.

Xylaria plebeja, *Ces.* *Mycet.* Born. 1879, p. 16.

On bush stumps, Para plantation, Agege, 1914, No. 64. A form with spores slightly smaller than in the type.

X. Thwaitesii, *Berk. et Cooke* in *Grevillea*, xii. 1883, p. 1.

On decaying wood in a shady situation, high forest, Agege, 1914, No. 65.

X. allantoides, *Berk.* in *Journ. Linn. Soc.* x. 1869, p. 380.

In shady situation in high forest, Itu, 1914, No. 66.

Ustulina zonata (*Lév.*) *Sacc.* *Syll.* i. p. 352.

On diseased *Hevea brasiliensis*, Economic Gardens, Calabar, 1914, No. 68.

Hypoxyton suborbiculare, *Welw. et Curr.*, var. *Cookeanum*, *Sacc.* *Syll.* i. p. 399.

Very common on felled trees all over the Colony. Ibadan, 1914, No. 61.

Kretzschmaria paradoxa, *Pat.* in *Bull. Soc. Myc. Fr.* viii. 1892, p. 50.

On decaying Oil-Palm by river-side, Ibadan, 1914, No. 63.

K. coenopus (*Mont.*) *Sacc.* *Syll.* ix. p. 565.

On decaying wood in high forest, Agege, July, 1914, No. 62.

DISCOMYCETACEAE.

Cookeina Tricholoma (*Mont.*) *O. Kuntze* in *Rev. Gen. pl.* 2, 1891, p. 849.

On dead wood in high forest, Agege, July, 1914, No. 59.

C. sulcipes (*Berk.*) *O. Kuntze.* loc. cit.

For synonymy see Seaver in *Mycologia* v. 1913, p. 189.

Gambari (Mamu) Forest Reserve, 1916, No. 87.

Differs from *C. Tricholoma* in the broader spores, as well as in the fewer and shorter hairs on the margin of the cup.

Plicaria congregata, *Wakef.* sp. nov.

Ascomata subcupulata vel demum convexo-expansa, undulata, 0.5-1.5 cm diametro, extus verrucosa, brunnea, disco concolore. *Asci* cylindrici, breviter stipitati, octospori, $230 \times 15-17 \mu$, pars sporifera circa 110μ longa. *Paraphyses* hyalinae, simplices, sursum clavati, ad $6-8 \mu$ lati. *Sporae* globosae, grosse verrucosae, pallide fuscescentes, $15-16 \mu$ diametro. *Hypothecium* et excipulum pseudoparenchymaticum; hypothecii cellulae ad 80 diametro, excipuli minores. *Cellulae* exteriores brunneae, hinc inde in verrucas aggregatae.

S. NIGERIA. Gambari Forest Reserve; on burnt wood, C: *O. Farquharson*, 1916.

Differs from other species of *Plicaria* in the densely crowded habit.

Sarcosoma turbinatum, *Wakef.* sp. nov.

Ascomata sessilia vel substipitata, turbinata, 2-2.5 cm. diametro,

2.5–3 cm. alta, extus fuliginosa, pilis brunneis septatis apice obtusis 4–10 μ crassis vestita, intus subhyalino-gelatinosa. *Discus* planus, sordide flavidus, margine tumido cinctus. *Asci* cylindrici, circa 360 $\times$ 10–15 μ , pars sporifera circa 160 μ . *Paraphyses* hyalinae, filiformes, apice vix incrassatae, ascos superantes. *Sporae* hyalinae, ellipticae vel fusioideae, primo utrinque obtuse apiculatae, episporio maturitate minute granuloso, 28–30 $\times$ 12–15 μ .

S. NIGERIA. Western Provinces: Shagamu; on wood, C. O. Farquharson, 1916.

This species somewhat resembles *S. camerunense*, P. Henn., but it differs in growing on wood, and in the hyaline, slightly rough spores. The spore-characters also distinguish it from other species with the same habitat, such as *Bulgaria Urnula*, Henn. and *S. javanicum*, Rehm.

DEUTEROMYCETACEAE.

Monilia carbonaria, Cooke in Grevillea, xv. 1886, p. 17.

Widely distributed throughout the Colony on all kinds of vegetable refuse, especially if charred.

This fungus appears to occur throughout the Tropics on burnt wood, etc. It was first described from New Zealand, on burnt branches, and has been received at Kew from Queensland, as well as from Nigeria. In the Malay States it appears to be common, but it has hitherto been recorded in Malay literature under the erroneous name of *Oospora gilva*, B. et Br., which is an entirely different plant.

Through the courtesy of Mr. F. T. Brooks I have examined the Malayan fungus, which he mentioned under the name of *Oospora gilva* in Bull. 21, Dept. of Agric., Fed. Malay States, p. 23, and which he informs me is so understood by Malayan mycologists generally. It proves to be specifically identical with the Nigerian fungus, and has no resemblance to *Oospora gilva*. The name *Oospora gilva* also appears in the Philippine lists, but whether a similar mistake has been made there I am unable to say, as I have seen no Philippine specimens.

Furthermore, the same fungus or one very closely allied to it occurs in Brazil, and is described by Möller in Schimper's Botanische Mitteilungen, Heft 9, Phycomyceten und Ascomyceten, p. 75 et seq.

Möller connected the Brazilian fungus with an ascigerous stage, which he called *Melanospora erythraea*. No ascigerous form has as yet been identified as belonging to *Monilia carbonaria*. Möller also states that the fungus is most common in the wet season, whereas the contrary is the case in Nigeria. It cannot therefore be assumed that the species are identical, but they are obviously very close.*

* Since the above was written a collection of slides brought home by Mr. A. Sharples, Mycologist to the Department of Agriculture, Federated Malay States, has been examined. Amongst these was one labelled "Perithecia from a culture of *Oospora gilva*." The asci and spores in this slide agree well in general characters with those described by Möller for *Melanospora erythraea*. It is not possible to say whether any of the asci contained only four spores, but the spore size agrees with that of the smaller spores of *M. erythraea*, none being as large as 36 $\times$ 16 μ . The variations observed are 20–27 $\times$ 10–14 μ . The shape of asci and spores, and the longitudinal striations of the spore membrane, are the same as described by Möller (l.c. p. 76). It seems certain that *Melanospora erythraea* is a widely distributed fungus in the Tropics, but the perfect stage has so far only been obtained in culture.

Mr. Farquharson has supplied the following notes with regard to the growth of the fungus in Nigeria.

"This fungus is widely distributed throughout the colony and most probably along the West African coast. It is perhaps the most characteristic and the most striking form to be seen in the dry season when the natives fire the bush clearings in the making of their farms. During the dry season (November to March at Ibadan) rain falls but seldom, but not infrequently the nights are marked by heavy dews, when the night temperature may fall rather low, to 60 F.^o or even less.

"The fungus flora of burnt wood is not very extensive, but this form seems to have specialised in this direction. The charred wood, one might almost say, has hardly had time to cool, when the bright orange-pink spore-masses of the fungus begin to make their appearance. These spore-masses are large enough to be visible at a considerable distance. My own first acquaintance with it was when I saw it from the train as we went up country on my first arrival in the colony. The moisture requirement of the fungus must be extremely small, and the rapidity of its appearance on a freshly burnt substratum is quite extraordinary.

"It is seen with far less frequency in the wet season, but is common on cast-away corn cobs from which the corn has been eaten. It proved a nuisance one season on bags of ground cassava. All kinds of plantation trash, especially if charred, afford suitable substrata."

The fungus is remarkable for the varying size and form of the conidia, and for the ease with which the hyphae break up into their constituent cells. At maturity it consists of a loose powdery mass of conidia and hyphal segments, varying in diameter from 5 μ to 20 μ . It is not a typical *Monilia*, but the branched hyphae place it in this genus rather than in *Oospora*.

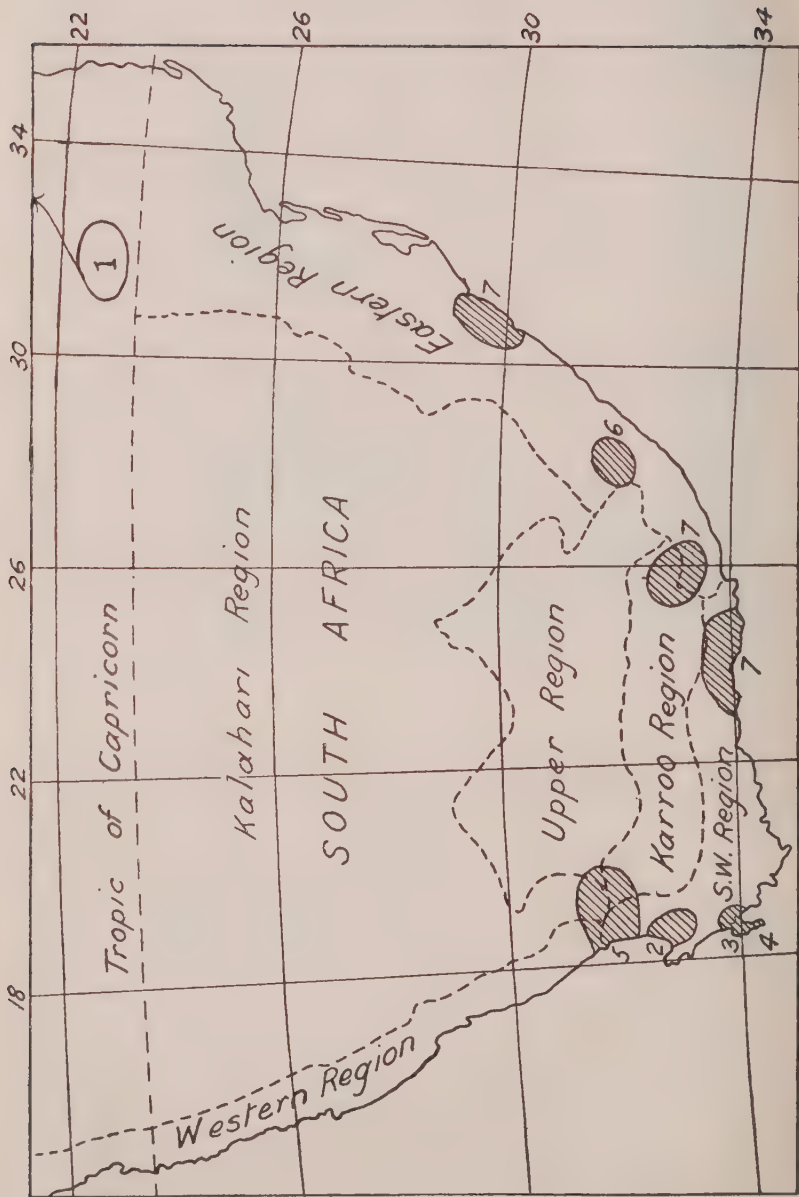
XVI.—NOTES ON AFRICAN COMPOSITAE: IV.

J. HUTCHINSON.

Matricaria, Linn., and *Chrysanthemum*, DC.

In a previous contribution* the necessity for a change in our conception of the genera *Pentzia* and *Matricaria*, based chiefly on their probable phyletic development in response to the peculiar climatic conditions in South Africa, has been shown; and the discoid species of *Matricaria* were accordingly transferred to *Pentzia*. It is suggested that *Pentzia* as thus defined has arisen directly from *Matricaria*. The entire suppression of ray-flowers, the usually shrubby habit, and the highly xerophytic type of leaf of the majority of the species of *Pentzia*, seem to point strongly in support of this hypothesis. A continuation of this line of descent may be clearly traced onwards to the considerable South African genus *Athanasia*, through the remarkably close relationship of *Pentzia pinnatifida* Harv., and *Athanasia acerosa*, Harv. The occurrence at the Cape of *Matricaria*, an otherwise entirely boreal genus, with only a single representative in Tropical Africa, and that not farther north than the Zambesi delta, suggests that the South

* *Kew Bull.*, 1916, 241.



Sketch map (after Bolus) showing distribution of *Matricaria* in South Africa: 1, *M. hispida* (in Zambesi Delta); 2, *M. glabrata*; 3, *M. capensis*; 4, *M. hirta*; 5, *M. tenella*; 6, *M. zuurbergensis*; 7, *M. nigellaefolia*.

African *Matricarias* are relics of the temperate flora of that vast antarctic continent now vanished, where the genus was probably as strongly represented as it is in the Northern Hemisphere at the present day. At the Cape all the species are endemic, and are remarkably local in their distribution (see map), a fact which seems to confirm the view that they are isolated relics and have not directly descended from their boreal relatives, for so far as we know, no species has as yet been gathered on those lofty East African mountains which have a few representative species of certain genera otherwise confined to the northern hemisphere. (See Engler in *Ann. Bot.* xviii. 523-540.)

The accompanying map shows the distribution of *Matricaria* in South Africa.

Matricaria, Linn.

CLAVIS SPECIERUM.

Achaenia minute vel distincte papposa :—

Pappus minutissime setulosus ; plantae ubique lanato-pilosae ; species zambesiaca ... 1. *hispida*.

Pappus oblique cupularis vel truncatus ; plantae plerumque glabrae vel glabrescentes ; species austro-africanæ :—

Achaenia pappo obliquo uno latere fisso dentato coronata ; caules erecti :—

Folia simpliciter pinnatisecta ; receptaculum ellipsoideum ... 2. *glabrata*.

Folia plerumque bipinnatisecta ; receptaculum subglobosum ... 3. *capensis*.

Folia plerumque bipinnatipartita, "asperate hispida," receptaculum ovato-conicum ... 4. *hirta*.

Achaenia pappo truncato integro coronata ; caules debiles et plerumque errabundi ; pedunculi longissimi, nudi ... 5. *tenella*.

Achaenia epapposa :—

Flores radii circiter 1 cm. longi, conspicui ; caulis elongatus, laxè ramosus, internodiis 4-5 cm. longis ; folia bipinnatisecta, segmentis lanceolatis acutissimis ... 6. *zurbergensis*.

Flores radii inconspicui, infra 0·5 cm. longi :—

Capitula circiter 1 cm. diametro ... 7. *nigellaefolia*.

Capitula circiter 0·5 cm. diametro ... 7. *nigellaefolia*,
var. *tenuior*.

1. **M. hispida**, *Vatke* in *Oestr. Bot. Zeitschr.* xxvii. 194 (1877) ; *Oliv. et Hiern* in *Oliv. Fl. Trop. Afr.* iii. 397.

TROPICAL AFRICA.—Portuguese East Africa : wet places near Sena, Zambesi, *Hildebrandt* ; *Peters* ; Zambesi delta between Mambusha and Vicénte, Sept., *Scott* ; open woods at Beira, Dec., *Swynnerton*. 1872.

I have not seen the type specimen collected by *Hildebrandt*, but there seems little doubt that *Scott's* and *Swynnerton's* plants belong to this species, judging from *Vatke's* description.

2. **M. glabrata**, *DC.* *Prodr.* vi. 51 (1837) ; *Harv.* in *Harv. et Sond. Fl. Cap.* iii. 165.

Chrysanthemum glabratum, Thunb. Fl. Cap. ed. Schult. 693 (1823).
Pyrethrum glabratum, Less. Synop. Comp. 254 (1832).

SOUTH AFRICA.—S.W. Region: Piquetberg; near Groene Vallei, below 320 m., Oct., Drège. 'S. Africa,' Thunberg (type).

3. *M. capensis*, Linn. Mant. 115 (1767); Thunb. Fl. Cap. ed. Schult. 693; DC. Prodr. vi. 50; Harv. in Harv. et Sond. Fl. Cap. iii. 164; Bolus et Wolley-Dod in Trans. S. Afr. Phil. Soc. xiv. 282.

Cotula capensis, Linn. Sp. Pl. 287 (1763).

Matricaria africana, Berg. Pl. Cap. 296 (1767).

M. pusilla. Willd. Enum. ii. 907 (1809); Poir. Dict. Suppl. iii. 605; DC. Prodr. vi. 52 (fide J. Gay).

SOUTH AFRICA.—S.W. Region: Cape; Vaarsche Vley, Nov., Wolley-Dod 3646. 'S. Africa,' Pappe; Hort. Gouan.—Cultivated in Jardin des Plantes, Paris, in 1835 (Herb. Gay).

According to Bolus and Wolley-Dod (l.c.), this species is rare; it grows in sandy places and hillocks in Vaarsche Vley on the Cape Peninsula.

4. *M. hirta*, DC. Prodr. vi. 51 (1837); Harv. in Harv. et Sond. Fl. Cap. iii. 165; Bolus et Wolley-Dod in Trans. S. Afr. Phil. Soc. xiv. 282.

Chrysanthemum hirtum, Thunb. Fl. Cap. ed. Schult. 693 (1823).
Pyrethrum hirtum, Less. Synop. Comp. 254 (1832).

SOUTH AFRICA.—S.W. Region: Cape; wet depressions near Cape Town, Thunberg (type); marshes near the Salt River, Cape Flats, Harvey.

I have not seen an example of this species; it was not found on the Cape Peninsula by Bolus and Wolley-Dod, who doubt its distinctness from *M. capensis*.

5. *M. tenella*, DC. Prodr. vi. 51 (1837); Drège, Zwei Pflanzengeogr. Docum. 107, 109; Harv. in Harv. et Sond. Fl. Cap. iii. 165.

M. tenella, var. *multicaulis*, Drège Herb.

SOUTH AFRICA.—S.W. Region: Vanrhynsdorp; Ebenezer, sandy heights below 160 m., Nov., Drège; Zout River, 145 m., Aug., Schlechter 8114. Clanwilliam; Lange Valley, below 330 m., July, Drège b; fields near Clanwilliam, Oct., Bolus 9028; Schlechter 8012. Upper Region: Calvinia; Nieuwoudtville, Leipoldt in Herb. Bolus 9389. 'S. Africa,' Zeyher 829.

6. *M. zuurbergensis*, Oliv. in Hook. Ic. Plant. t. 2230 (1892).

SOUTH AFRICA.—Eastern Region: in woods at Malowe and on the Zuurbergen, 1300 m., Mar., Tyson 2768 (Herb. Norm. 1064); in shady bush on the Zuurberg, Wood 3046.

7. *M. nigellaefolia*, DC. Prodr. vi. 50 (1837); Drège, Zwei Pflanzengeogr. Docum. 130, 140; Harv. in Harv. et Sond. Fl. Cap. iii. 164.

SOUTH AFRICA.—S.W. Region: Knysna; Wittedrift and Plettenbergs Bay. Pappe. Uitenhage: between Coega River and Sunday River, chalk flats below 320 m., Dec., Drège. Karroo Region: Somerset; by the Great Fish River at Van Aardt's, June, Burchell

3255; 3248. Eastern Region: Albany; Zwartwater Poort, on the rocks. July, *Burchell* 3357; moist valleys near Grahamstown. Nov., *MacOwan* 557; King Williamstown; Kei Road, 620 m., Dec., *Schlechter* 6136; Natal; Inanda. *Medley Wood* 624 ("aquatic"); Mt. Moreland. Nov., *Medley Wood* 1387; without definite locality. *Gerrard* 566; *Saunders*.—Cultivated at Kew in 1861, at the Jardin des Plantes, Paris, in 1839 (*Herb. Gay*), and at Chelsea in 1852 (*Herb. Thos. Moore*).

Var. **tenuior**, DC. l.c.; Harv. l.c.

SOUTH AFRICA.—Eastern Region: Albany; near Grahamstown, Feb., *Baur* 1059; Dec., *Drège*. Natal; near Curry's Post. 1300 m., Dec., *Medley Wood* 3600; without definite locality, *Cooper* 1146.

SPECIES EXCLUDENDA.

Matricaria pinnatifida. Klatt in Bull. Herb. Boiss. iii. 437 (1895) = **Anisopappus pinnatifida**, O. Hoffm. MSS. in Herb. Zurich.

I am much indebted to Dr. Hans Schinz for examining the type specimen and acquainting me with this new combination.

Chrysanthemum, DC.

The genus *Chrysanthemum*, as defined by Bentham and Hooker, is distributed throughout Europe, Temperate Asia, North Africa and Orient, and Arctic America. It embraces about 130 species; a few such as *C. segetum*, L., *C. Parthenium*, Pers., and *C. leucanthemum*, L., being widely dispersed weeds of cultivation. The species, mostly indigenous to the areas mentioned, are distributed as follows:—Europe, 45; Canaries and Madeira, 16; North Africa, 21; Orient, 14; Himalaya, 3; North Asia, 18; China and Japan, 13; Arctic America, 1; South Africa, 5. Here again, as in the case of *Matricaria*, there is a big gap in distribution, the bulk of the genus occurring in the Northern Hemisphere, with a few endemic species at the Cape. The nearest related species to the South African, and they are also nearest geographically, are those of the Canary Islands, where they are of a similar shrubby habit. Eventually, no doubt, as these interesting facts accumulate, some light may be thrown on the origin and affinities of the Cape *Compositae*.

CLAVIS SPECIERUM.

Pappus bene evolutus, corollae tubo equilongus vel fere aequilongus:—

Pedunculi elongati, nudi, 5–15 cm. longi:—

Folia basi tumida, non decurrentia, lobis longis et gracilibus ascendentibus acutis
2–4 cm. longis 1. *nodosum*.

Folia basi ?, lobis brevissimis dentiformibus patulis subacutis; species mihi ignota ... 2. *Thunbergii*.

Folia integra, decurrentia, basi non tumida ... 3. *decurrens*.

Pedunculi breves et foliacei, parte nuda vix 1.5 cm. longa:—

Folia omnia vel fere omnia apice breviter trilobata, 0.5 cm. longa 4. *carnosulum*.

Folia omnia vel plerumque integra, uncinata 1 cm. longa 4. *carnosulum*,
var. *filifolium*.

Pappus minutus vel nullus :—

Capitula solitaria, caules vel ramos simplices vel subsimplices terminantia; folia dentata vel lobulata :—

Rhizoma vel radix basi non lanata; species introductae :—

Plantae annuae; folia plerumque lobulata; flores radii flavi 5. *segetum*.

Plantae perennes; folia obtuse dentata; flores radii albi 6. *leucanthemum*.

Rhizoma basi dense lanatum; folia argute serrata, acuta... .. 7. *osmitoides*.

Capitula densiuscule corymbosa; folia bipinnatifidipartita; species introducta 8. *Parthenium*.

1. **C. nodosum**, DC. Prodr. vi. 65 (1837); Harv. in Harv. et Sond. Fl. Cap. iii. 162.

Arctotis nodosa, Thunb. Fl. Cap. ed. Schult. 711 (1823).

Pinardia nodosa, Less. in Linn. 1831, 169. *Ismelia nodosa*, Less. Synop. Compos. 255 (1832).

Chrysanthemum leptophyllum, var. *indivisum*, Drège, Zwei Pflanzengeogr. Docum. 95; var. *trisetum*, Drège l.c. 108.

SOUTH AFRICA.—South-Western Region: Vanrhynsdorp; Ebenezer, on stony dry “karroo-like” hills, below 160 m., Nov., Drège var. *a*, *a*; Windhoek, 230 m., Aug., Schlechter 8353. Clanwilliam; between Lange Valley and Heerenlogement, below 160 m., July, Drège *a*, *b*. Western Region: Little Namaqualand; between Zwart Doorn River and Groen River, below 1000 ft., Aug., Drège, β , *a*. Kalahari Region: Calvinia; Bitterfontein, hills, Sept., Schlechter 11034.

2. **C. Thunbergii**, Harv. in Harv. et Sond. Fl. Cap. iii. 162 (1865).

Chrysanthemum frutescens, Thunb. Fl. Cap. ed. Schult. 693 (non Linn., quoad plantam Canariensis).

Pyrethrum frutescens, Thunb. ex Harv. l.c. nomen.

Ismelia frutescens, Less. Synop. Comp. 255 (1832).

Pinardia frutescens, Less. in Linnaea 1831, 169.

SOUTH AFRICA.—Without definite locality, *Thunberg*.

Species not seen by the writer; the type is only in Herb. Thunberg.

3. **C. decurrens**, Hutchinson, sp. nov.

Planta carnosa, usque ad 20 cm. alta; ramuli ascendentes, glabri. *Folia* basi decurrentia, linearia, apice obtuse callosa, 3–4 cm. longa, circiter 1.5 mm. lata, integra, glabra. *Capitula* solitaria, longe pedunculata, circiter 1–1.4 cm. diametro; pedunculi nudi, usque ad 12 cm. longi, glabri. *Involucrum* late campanulatum; bractee 3–4 seriatas, exteriores oblongo-ovatae, apice rotundatae, intermediae et interiores obovato-rotundatae, 3–4 mm. longae, 2–3 mm. latae, margine membranaceae, glabrae. *Flores radii* brevissimi, ligulati; corollae tubus 1.5 mm. longus, glaber, limbo brevissime cuneato-spathulato truncato

minute crenulato 4-nervio. *Flores disci* : corollae tubus 1 mm. longus, lobis triangularibus subacutis marginibus incrassatis ; antherae conspicue appendiculatae, apice glandulo flavo coronatae. *Achaenia* compressa, pilis densis mucilaginosus albis marginata. *Pappi squamae* 3 vel 4, imbricatae, orbiculares, 1.5 mm. diametro, siccae et membranaceae.

SOUTH AFRICA.—Western Region : Little Namaqualand ; in dry places between Port Nolloth and Oograbies, about 100 m., Aug., *Bolus* 9571.

This is a very marked new species with fleshy stems and leaves, the latter decurrent on the shoots.

4. *C. carnosulum*, DC. Prodr. vi. 65 (1837) ; Harv. in Harv. et Sond. Fl. Cap. iii. 162.

Pyrethrum frutescens, Thunb. partly ex Harv. l.c., nomen. *Pentzia frutescens*, Fenzl ex Harv. l.c., nomen.

SOUTH AFRICA.—South-Western Region : Bredasdorp ; Zeekoevley, 30 m., Apr., *Schlechter* 10539. Swellendam ; between Rietkiul and Hemel en Aarde, on the Kenko River, below 320 m., *Zeyher* 2831. Riversdale ; hills near Zoetemelks River, Nov., *Burchell* 6741 ; between Great Valsch River and Zoetemelks River, Nov., *Burchell* 6578 ; Gauritz River, *Pappe*.

Var. *filifolium*, Harv. l.c. 163.

South-Western Region : Caledon ; in open places near Springs, Apr., 280 m., *Bolus* 7464 ; Bot River, 340 m., Apr., *Schlechter* 7591. Swellendam ; hills between Swellendam and Breede River, shrub 2 ft. high, Jan., *Burchell* 7450 ; on dry hills near Breede River, Jan., *Burchell* 7461 ; near Swellendam, Dec., *Pappe* [type of var.]. Karroo Region : Ceres ; Klyn Vley, Cold Bokkeveld, 1420 m., Jan., *Schlechter* 10216.

This is usually a well-marked variety, which is, however, scarcely deserving of specific rank ; the leaves are longer and more slender than in the typical form and they are nearly always entire and uncinat at the tip. In *Schlechter*'s specimen from Ceres (no. 10216) the leaves are both entire and divided on the same shoot, and there is also a note to this effect by Harvey regarding *Pappe*'s specimen in Herb. Dublin, which is the type of the variety.

5. *C. segetum*, Linn. Sp. Plant. 1254 (1763) ; DC. Prodr. vi. 64 ; English Botany, t. 540, Harv. in Harv. et Sond. Fl. Cap. iii. 162 ; *Bolus* & Wolley-Dod in Trans. S. Afr. Phil. Soc. xiv. 282.

SOUTH AFRICA.—The common "Corn Marigold," introduced from Europe.

6. *C. leucanthemum*, Linn. Sp. Pl. 888 (1763).

SOUTH AFRICA.—Eastern Region : East Griqualand ; in meadows near Kokstad, 1600 m., Feb., *Tyson* 1705. Natal ; Van Reenen, 1600–2000 m., Jan., *Wood* 9009.

The common "Dog-Daisy," introduced from Europe.

7. *C. osmitoides*, Harv. Thes. Cap. ii. 33, t. 152 (1863) ; Harv. in Harv. et Sond. Fl. Cap. iii. 163.

SOUTH AFRICA.—Eastern Region : Natal ; Omgati, *Gerrard* 1026. Kalahari Region : Transvaal ; hills above Barberton, 1320 m., Oct., ray fls. white, disk yellow, *Thorncroft in Herb. Wood* 5729 ; grassy mountain slopes of the Saddleback Range, Barberton, 1100–1480 m., Nov., “heads cream colour,” *Galpin* 685.

8. *C. Parthenium*, *Pers.* Synop. ii. 462 (1807).

SOUTH AFRICA.—Without definite locality, *Harvey*. A common garden plant, introduced.

XVII.—SEED SELECTION IN THE CULTIVATION OF *HEVEA BRASILIENSIS*.

The following letter from Mr. F. A. Stockdale, Director of Agriculture, Ceylon, has been received by the Director with a note on seed selection of *Hevea* in Ceylon, which has been drawn up by Mr. T. PETCH, Botanist and Mycologist to the Department of Agriculture.

Department of Agriculture,
Peradeniya, Ceylon,
26th May, 1917.

SIR,

1. With reference to the article on Seed Selection in the Cultivation of *Hevea brasiliensis* by Messrs. Clayton Beadle and Henry P. Stevens, I have the honour to forward for publication the enclosed brief note which has been prepared, at my request, by Mr. T. Petch, Botanist and Mycologist of this Department.

2. This gives a brief account of the attempts made by this Department in Ceylon in regard to seed selection of *Hevea*. The whole research has only been limited by the want of men and money and will, I hope, after the war, be extended—possibly with the help of the Rubber Growers' Association.

3. This account refutes statements by Messrs. Clayton Beadle and Henry P. Stevens and by Mr. Marsden as to inaction in the matter of seed selection—statements which would not have been made had they been in touch with the work being carried out by this Department in Ceylon.

I am, Sir,
Your obedient Servant,

The Director,
Royal Botanic Gardens,
Kew.

F. A. STOCKDALE,
Director of Agriculture.

SEED SELECTION IN *HEVEA*.

The question of seed selection in *Hevea* was a subject of discussion at the Ceylon Rubber Exhibition in September, 1906, and one of the deciding factors in the appointment of the late Dr. R. H. Lock as Assistant Director of the Royal Botanic Gardens, Ceylon, a year later, was his recognised standing as an authority on plant breeding.

Systematic experiments on rubber-tapping were begun in 1908 on the old trees at Heneratgoda, then the only tappable trees under the control of the Botanic Gardens, and when it had been established that Tree No. 2 at Heneratgoda steadily yielded an amount of rubber far in excess of any of the other trees in tapping, steps were taken to plant up an area with seed of that tree. There are now three acres of *Hevea* on the Experiment Station, Peradeniya, planted with that strain. The oldest (2 acres) was planted in 1912, with stumps one year old, and is not yet tappable. The intention at present is that when these trees are fit for tapping they will be tapped to determine which of them are good yielders; the poor yielders will then be cut out, and the area reserved for seed. It is of course recognised that investigations on the subject of the inheritance of latex capacity may compel modifications of the scheme.

Other experiments at Heneratgoda have yielded a mass of data, which, owing to the reduction of the scientific staff, has not yet been analysed. For example, an experiment was begun in 1908 on seventy trees tapped at different (time) intervals, in groups of ten. Through the removal of a shelter belt, several of these were blown down in 1913, but there still remain some fifty trees whose individual latex yield has been recorded for every tapping since June, 1908, the trees having been tapped continuously at regular intervals, varying in the different groups from one to seven days. And there is a large number of trees whose individual latex or rubber yield has been recorded for periods of one to two years. It is, therefore, scarcely correct to state that no attempt has been made to obtain reliable data as to the variation in yield of latex and rubber from individual trees.

In 1912, an attempt was made to attack the problem from another side, viz., to determine whether the latex-yielding quality can be associated with any definite botanical character, and to what extent such characters are transmitted.

On this subject, the individual planter generally has very definite views, but few agree with one another. In Ceylon, three types of bark are usually distinguished, smooth, moderately corky, and very corky. The smooth-barked tree is often regarded as a poor yielder, and this appears to be true, if the smooth exterior is associated with a yellowish and somewhat granular internal structure. But there is some evidence that the external appearance of the trees, in Ceylon, varies with the elevation of the plantation. Differences in the foliage have also been associated with latex yield, the small-leaved tree being regarded as a poorer yielder than the large-leaved form. On the other hand, the large-leaved tree appears to suffer more from the leaf-fall caused by *Phytophthora* than the small-leaved, though it remains to be determined whether this is merely due to the fact that the loss of the same number of leaves makes a greater difference in the appearance of the tree in the former. There is also a tree with a dark glossy leaf which contrasts strongly with the normal leaf, a fact which may prove of service in the matter of disease resistance. With regard to the colour of the bark, it was stated in Ceylon some ten years ago that trees with a pink bark were poor yielders. On examination it was found that the pink external coloration was due to the presence of a red alga (*Chroolepidae*), which finds a better footing on smooth than on rough-barked trees. This accords with the late Dr. Huber's statement that

the difference between the white and black *Hevea* of the Amazon is due merely to the growth on the stem of different species of lichens, according to the exposure of the tree.

Seeds were selected in 1912 from trees which showed well-marked characters, seed and leaf characters being chosen as a beginning. The experiment however was regarded as a purely scientific fad, and the subsequent treatment of the plants was such that it has small prospect of result. A large number of trees is required, before any definite conclusions can be based on such experiments, and this necessitates the occupation of an acreage which at the present time is not available.

A small experiment which may afford preliminary ideas on the relation of yield to botanical characters has been in progress for nearly a year. Twenty trees of the same age, growing in a four-acre block at the Experiment Station, Peradeniya, have been selected for differences in leaf or bark characters. These are all tapped on the same system, and the yield of rubber from each tree is recorded separately for every tapping.

Reference may also be made to the investigations on *Hevea* cortex by Messrs. Bryce and Campbell which were designed ultimately to discover whether any relation existed between structure and yield. Preliminary bulletins have been issued, but the work has now lapsed owing to the departure of both these officers on military service.

The problem of seed selection in *Hevea* has been attacked by the Ceylon Department of Agriculture from both the empirical and the scientific standpoint, but it is not possible to attain results rapidly, and the rate of progress is necessarily governed by the money and men available for the work.

T. PETCH.

XVIII.—MISCELLANEOUS NOTE.

Plant Diseases in Queensland.—*The Diseases in Plants Act* of 1916 which has recently been introduced in Queensland provides measures with regard to the introduction and eradication of diseases in that country. The Act came into operation on January 1st, 1917.

Every insect, fungus, and plant introduced into Queensland or removed from any nursery or orchard contrary to the Act, and every diseased plant or infected package introduced into Queensland or removed from one part of the State to another may be forthwith seized by an inspector and dealt with by destruction or otherwise as the Minister or inspector may direct. Under penalty of a fine every orchard and nursery must be registered on or before March 31st each year. Two schedules under the Act provide respectively for the "Nursery" return (area of nursery) and the "Orchard" return (number of acres of bananas, pine-apples and number of fruit trees).

Except in the case of injury and destruction of non-diseased plants, persons are not entitled to any compensation in consequence of any measure taken for the eradication of the disease or the destruction of any insect, fungus, or diseased plant. Persons guilty of an offence against the Act are liable to a penalty not exceeding £20.

That Queensland intends to take strict precautions against the introduction and spread of diseases is evident from the details of the Act, and especially from the schedules regarding the registration of orchards and nurseries.

A. D. C.